THE OHIO STATE UNIVERSITY
RESEARCH FOUNDATION

Report No. 12 Proj. 281

REPORT

By

THE OHIO STATE UNIVERSITY
RESEARCH FOUNDATION
COLUMBUS 10, OHIO

Cooperator U.S. NAVY, OFFICE OF NAVAL RESEARCH

Contract Number N6onr-225, T.O. I

ONR Project Number NR 058 031

Investigation of VAPOR PRESSURE OF METALS AND METAL OXIDES.

Subject of Report Twelfth Quarterly Progress Report

Submitted by H.L. Johnston

Date July 1, 1949

#8

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PROGRESS REPORT ON PROJECT RF-281

INVESTIGATION OF VAPOR PRESSURE OF METALS AND METAL OXIDES

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1. Personnel.

No change in personnel on this project during the last report period.

2. Vapor Pressure of Columbium.

The experimental work in columbium is nearly completed and the data is being processed for a technical report.

3. Vapor Pressure of Al_2O_3.

About 15 runs were made with Al_2O_3 is a molybdimum Knudsen cell. Flat targets and hollow spherical quartz targets (with a 2 cm. hole for the vapor to enter) have been employed to determine whether or not Al_2O_3 dissociates in neighborhood of 1700 to 1900°C. The spherical quartz target was used to ascertain if the failure of the mass of the vapor evaporating from the cell to balance the mass intercepted by the target was due to thermal dissociation of the Al_2O_3 into non-condensible products or whether it was due to the fact that the accommodation coefficient for the condensation of Al_2O_3 on the target was not unity. The data indicates that Al_2O_3 dissociates into an oxygen deficient product. Vapor pressure measurements by these methods will be abandoned for the time being. A technical report on the data so far obtained will be prepared as this material may be of use to research workers employing Al_2O_3 in high temperature research.

4. Vapor Pressure of Zirconium.

A zirconium Langmuir ring was prepared by first fusing some pure zirconium in a low pressure argon arc furnace and then machining the resultant ingot into a ring. This method of fusion yields almost completely uncontaminated ingots since a water cooled copper crucible is employed and the molten metal does not wet the crucible. Utilization of a tungsten rod as an anode eliminates the possibility of contamination with the anode material.

A number of runs have been made with zirconium and the work is progressing well.

5. Vapor Pressure of Boron.

A boron carbide liner inside a graphite Knudsen cell has been made by heating boron and graphite to 2100°C.

Successful measurements of the boron vapor pressure have been made but the work is slow and tedious. A new Knudsen cell has to be made about every third run and many hours are consumed in preparing the Knudsen

cells. However, these measurements although laborious are very promising.

6. The Vapor Pressure of Chromium.

A chromium Langmuir ring has been prepared by the same method employed in the preparation of the zirconium ring. Preliminary vacuum treatment of the sample will be started.

7. The Vapor Pressure of Alumimum and Tantalum.

Work on these two materials have been deferred for the time being.

8. Technical Reports.

Technical reports are being prepared for gallium and B_2O_3. Their titles will be,

Tech. Report No. 4, "The Vapor Pressure of Inorganic Substances. II B_2O_3".
Tech. Report No. 5, "The Vapor Pressure of Inorganic Substances. III Gallium".

NOTE: In submitting this report it is understood that all provisions of the contract between The Foundation and the Cooperator and pertaining to publicity of subject matter will be rigidly observed.

Investigator Rudolph Speiser **Date** JUL 1 1949

Supervisor Herrick L Johnston **Date** JUL 1 1949

For The Ohio State University Research Foundation

Executive Director James L. Quinn W.R.F. **Date** 9/16/49